

# **ARE MEDICATIONS INVOLVED IN VISION AND INTRACRANIAL PRESSURE CHANGES SEEN IN SPACEFLIGHT?**

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## **INTRODUCTION**

Some crewmembers have experienced changes in their vision after long-duration spaceflight on the ISS. These impairments include visual performance decrements, development of cotton-wool spots or choroidal folds, optic-disc edema, optic nerve sheath distention, and/or posterior globe flattening with varying degrees of severity and permanence. These changes are now used to define the visual impairment/intracranial pressure (VIIP) syndrome.

The reasons for these potentially debilitating medical issues are currently unknown. The potential role of administered medications has not yet been examined, but it is known that many medications can have side effects that are similar to VIIP symptoms. Some medications raise blood pressure, which can affect intracranial pressure. Many medications that act in the central nervous system can affect intracranial pressures and/or vision. About 40% of the medications in the ISS kit are known to cause side effects involving changes in blood pressure, intracranial pressure and/or vision. For this reason, we proposed an investigation of the potential relationship between ISS medications and their risk of causing or exacerbating VIIP-like symptoms.

The purpose of this study was to use medication usage records for affected and unaffected crew to determine if use of particular medications seemed to correlate with VIIP occurrence or severity.

## **METHODS**

This protocol was approved by the JSC IRB, and all crewmember participants provided consent. LSAH provided medication usage data from a total of 37 individuals on 39 missions: 27 ISS crewmembers on 29 ISS missions and 12 Shuttle crewmembers who were on missions of less than 30 days. There were 30 males on 32 missions and 6 females on 7 missions. There were 20 ISS missions represented, and 11 Shuttle missions.

## **RESULTS**

Briefly, we examined the medication use records of all consenting crewmembers who have had a CPG score assigned to them. The subjects included males and females, ISS crew, and shuttle crew, VIIP cases and confirmed non-cases. As expected from a study with this number of subjects and lack of details in medication usage records, we have discovered no “smoking gun” cause of VIIP in crew subjects. We have however, identified some medications used by crew that could be exacerbating factors in VIIP. Notable findings include:

1. Usage rates of NSAID pain relievers are relatively high in some crewmembers; these drugs are known to be associated with side effects that are similar to VIIP symptoms.
2. Promethazine and pseudoephedrine, once speculated to be involved with VIIP, were used similarly by unaffected crew and affected crew.
3. Usage rate of sleep medications were relatively high; their association with VIIP-like side effects is not currently known.
4. There was a high usage rate of corticosteroid medications (topical and oral) by a few individuals. These drugs are known to be associated with side effects that are similar to VIIP symptoms.

## **DISCUSSION**

The small number of subjects using any particular medication limits the conclusions that can be drawn from the current analysis. Notwithstanding, these data may serve to highlight areas in which replacement of systemic treatments with topical treatments could be considered, namely treatments for joint or muscle pain as well as skin problems. It may also be useful to attempt to reduce medication use for certain indications, perhaps by alterations in mission operations or hardware, particularly with respect to enabling better sleep.

